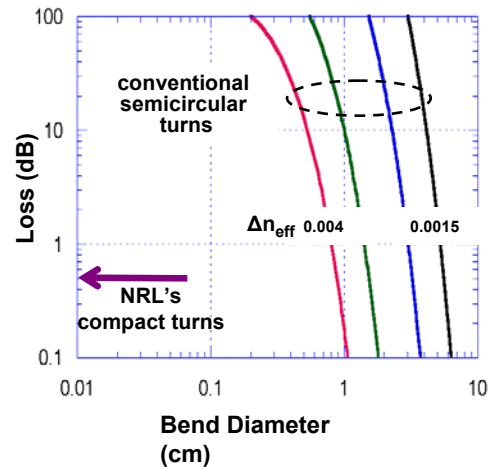
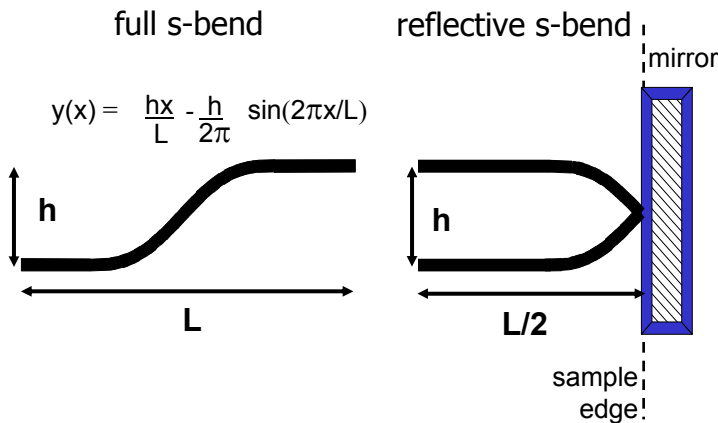


LOW-LOSS COMPACT TURNS IN OPTICAL WAVEGUIDES



The Naval Research Laboratory (NRL) has developed a novel 180° waveguide turn which is compact and has low optical loss. This turn is based on a reflective s-bend, which has a gradual transition region and a mirror positioned at the steepest part of the bend. The figure on the right shows optical loss as a function of bend diameter (h) for NRL's compact turns and conventional semicircular waveguide turns. The different curves have varying waveguide effective indices (Δn_{eff}) which are typical for diffused waveguides. The losses and bend diameters of conventional semicircular waveguide turns are prohibitively high for most practical applications. NRL's compact reflective s-bend turn solves this problem, allowing much more efficient use of real estate and higher levels of integration.

The reflective s-bend turn has been demonstrated in Ti-diffused LiNbO₃ waveguides, and is applicable to a wide range of materials, including polymers and semiconductors.

Advantages and features include:

- **Low loss:** 0.5 dB optical loss for 180° turn
- **Compact:** 2 orders of magnitude improvement compared with semicircular turns, allowing effective bend diameters < 100 μm
- **Integration:** enables higher levels of integration of multiple components on a single chip
- **Longer active regions:** enables multiple-pass devices with longer active regions and lower drive voltages, such as multiple-pass modulators

Applications include:

- RF sensing
- Optical processing
- Optical communication

Licenses are available to companies with commercial interest.

Points of Contact

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